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PAR 213
30 Nov 64

SUBJECT: Color Reproduction Systems Review

TASK/PROBLEM

1. In view of the recent importance attached to color photography by the intelligence community, investigate and determine the most suitable means to reproduce and utilize multiple copies of color materials. Determine the most suitable reproduction system and types of equipment to be used in all phases of the reproduction cycle. Also, attempt to define how color photography can best be utilized by the photo interpreter.

DISCUSSION

2. Duplication and reproduction system studies have been concentrated in the enlarging and contact printing stages during the past quarter. In the contact printing stage, two techniques were used:

a. White light printing (color compensating filters)

b. Tri-color printing (narrow bands of red, green and blue filtered light)

The results of the evaluation of the two methods indicate that the tri-color (or additive) printing renders improved resolution, higher color saturation and slightly higher contrast with less inter layer effect or layer contamination. When using the additive printing method for making a black-and-white duplicate, certain colored objects did not record with white light printing but did print when using narrow-band light. This indicates that narrow-band printing should be used for contact printing of both color and black-and-white films in the duplicating stage.

3. Tests to date indicate that duplication of a high altitude, high contrast, acquisition material onto the same material will give excellent results. High-altitude acquisition results in a low scene luminance range

and, therefore, the increase in contrast is acceptable. Further generations of the image will result in extremely high contrast and loss of information if duplicated to successive generations on Type SO-121 material. Therefore, the conclusion reached is that duplication onto a high contrast, high definition aerial original type material should not extend beyond the second generation.

4. Efforts continued on the development of techniques to produce the best methods for successive color enlargements. Of the six methods tried, the best quality was obtained by a 5X direct positive enlargement from the original onto Type SO-121. This enlargement gave the best definition. The best quality obtained for tone was a direct 5X positive enlargement from the original onto [redacted] Color Duplicating Film, Type SO-271. The most practical system for community usage appears to be use of contact print negative made from the original acquisition positive, using a material such as [redacted] Color Internegative Film. From this internegative, good quality enlargements for both resolution and tone can be produced. It is readily apparent that an internegative made from a high contrast data reduction copy will result in loss of resolution and tone. Therefore, the maximum information is available to the user through a data reduction copy plus a color internegative, both produced directly from the original.

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5. A progress review took place with customer representatives on 19 November 1964. All progress to date, including demonstration materials, was discussed. It was emphasized that color reproduction systems must be considered as a part of the entire acquisition system, which includes the original acquisition as well as the subsequent duplicating stages. Techniques and materials for both stages should be regarded as a unit rather than subdividing into parts and treating each separately.

6. Design and content of briefing aids were discussed with customer representatives. It was agreed that customer guidance was essential in or-

der to provide the most useful aids. It was further agreed that rough drafts of all briefing aids to be developed would be supplied to the customer for his approval prior to final art work.

7. Stereo viewing tests were conducted using material available from the acquisitions obtained in August. Enlargements and contact prints were used in stereo viewing combinations. The stereo image produced by color and black-and-white pairs indicated the need for suppressing the black-and-white brightness by the use of ND (neutral density) filters in the viewing beam. On an average, most scenes viewed required approximately a .7 to .9 ND in the black-and-white viewing beam to produce the visual sensation of color saturation in the stereo image.

PLANNED ACTIVITIES

8. Prepare rough drafts of briefing aid designs and submit for approval or further guidance by the customer.

9. Initiate preparation of the final report for PAR 213 as soon as possible. Completion is anticipated by the scheduled date of February 28, 1965.